CLAIMS

1. A method of aligning a receiver with respect to a reference symbol in data frames, comprising the steps of:

decoding each of a plurality of data frames into a plurality of symbols;

determining a weight value that each of said plurality symbols is a reference symbol;

accumulating said weight values for each corresponding symbol from said plurality of data frames to a plurality of values, and

aligning the receiver to the symbol corresponding to a one of said plurality of values which exceeds a threshold.

2. The method in claim 1, wherein said determining step further includes calculating the probability that each decoded symbol is in error with respect to the value of said reference symbol.

3. The method in claim 1, and wherein said determining step utilizes a look-up table of symbol decoding weight values.

4. The method of claim 1, and wherein said weight values are accumulated to said plurality of values by addition.

5. The method of claim 1, and wherein said weight values are accumulated to said plurality of values by multiplication.

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6. The method of claim 1, and wherein said threshold is a statistical probability representing a high confidence that the corresponding symbol is said reference symbol.

5 7. A method of aligning a data receiver to a reoccurring reference symbol in data frames, comprising the steps of:

receiving a signal equal to a single data frame;

decoding said signal into a plurality of symbols;

determining a plurality of weighted values that said plurality of symbols are

10 each a reference symbol;

repeating said receiving, decoding, and determining steps for a plurality of data frames;

accumulating sets of said plurality of weighted values, corresponding to sets of said plurality of symbols, into a plurality of values;

15 comparing said plurality of values to a threshold, and if a one of said plurality of values exceeds said threshold,

aligning the receiver to the symbol corresponding to the one of said plurality of values exceeding said threshold.

20 8. The method in claim 7, wherein said determining step further includes calculating the weighted values as probabilities that each decoded symbol is in error with respect to the value of said reference symbol.

9. The method in claim 7, and wherein said determining step utilizes a look-up

25 table of symbol decoding weighted values.

10. The method of claim 7, and wherein said plurality of weighted values are accumulated to said plurality of values by addition.

11. The method of claim 7, and wherein said plurality of weighted values are accumulated to said plurality of values by multiplication.

12. The method of claim 7, and wherein said threshold is a statistical probability representing a high confidence that the corresponding symbol is said reference symbol.

13. A method of aligning a receiver with respect to a plurality of reference symbols of predetermined relative location within data frames, comprising the steps of:

decoding each of a plurality of data frames into a plurality of symbols;

determining a weighted value that each of said plurality symbols is each of the plurality of reference symbols;

accumulating said weighted values for each corresponding symbol from said plurality of data frames to a plurality of values in an array indexed by the location of said plurality of symbols and said plurality of reference symbols;

calculating a plurality of ordinal probabilities by combining said accumulated weighted values in said array according to the relative predetermined locations of said plurality of reference symbols for each location of said plurality of symbols, organized into a weighted value array indexed by said location of each of said plurality of symbols, and

aligning the receiver to the symbol indexed to a one of said plurality of ordinal probabilities in said weighted value array that exceeds a threshold.

14. The method in claim 13, wherein said determining step further includes calculating the probability that each decoded symbol is in error with respect to the value of said plurality of reference symbols.

5   15. The method in claim 13, and wherein said determining step utilizes a look-up table of symbol decoding weighted values.

16. The method of claim 13, and wherein said weighted values are accumulated to said plurality of values by addition.

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17. The method of claim 13, and wherein said weighted values are accumulated to said plurality of values by multiplication.

18. The method of claim 13, and wherein said accumulated values are

15   combined to said plurality of ordinal probabilities by addition.

19. The method of claim 13, and wherein said accumulated values are combined to said plurality of ordinal probabilities by multiplication.

20   20. The method of claim 13, and wherein said threshold is a statistical probability representing a high confidence that the corresponding symbol is one of said plurality of reference symbols.

21. The method of claim 13, and wherein said plurality of ordinal probabilities

25   or ordered according to the relative positions of said plurality of reference symbols.

22. A method of aligning a receiver with respect to a plurality of reference symbols of predetermined relative location within data frames, comprising the steps of:

receiving a data frame;

5   decoding said data frame into a plurality of symbols;

determining a plurality of probabilities that each of said plurality of symbols is each of said plurality of reference symbols;

storing said plurality of probabilities into an array, indexed according to each one of said plurality of reference symbols and the location of each one of said

10   plurality of symbols;

repeating said receiving, decoding, and storing steps for a plurality of data frames, and, accumulating said plurality of probabilities in said array;

calculating a plurality of ordinal probabilities by combining said accumulated plurality of probabilities in said array according to the relative predetermined

15   locations of said plurality of reference symbols for each location of said plurality of symbols into a probability value array indexed by said location of each of said plurality of symbols;

comparing said plurality of ordinal probabilities in said probability value array to a threshold, and if a one values exceeds a threshold,

20   aligning the receiver to the location of the one of said plurality of symbols indexed to the one of said plurality of values exceeding said threshold.

23. The method in claim 22, wherein said determining step further includes calculating the probability that each decoded symbol is in error with respect to the

25   value of said plurality of reference symbols.

24. The method in claim 22, and wherein said determining step utilizes a look-up table of symbol decoding error probabilities.

25. The method of claim 22, and wherein said plurality of probabilities are accumulated by addition.

26. The method of claim 22, and wherein said probabilities are accumulated by multiplication.

27. The method of claim 22, and wherein said accumulated probabilities are combined to said plurality of ordinal probabilities by addition.

28. The method of claim 22, and wherein said accumulated probabilities are combined to said plurality of ordinal probabilities by multiplication.

29. The method of claim 22, and wherein said threshold is a statistical probability representing a high confidence that the corresponding symbol is one of said plurality of reference symbols.

30. The method of claim 22, and wherein said plurality of ordinal probabilities or ordered according to the relative positions of said plurality of reference symbols.

31. A method of aligning a receiver with respect to a plurality of reference symbols of predetermined relative location within data frames, comprising the steps of:

decoding a data frame into a plurality of symbols;

sequencing through said plurality of symbols and determining the probability that the present one of said plurality of symbols is a first one of said plurality of reference symbols, and, determining the weighted probability that the relatively located other of said plurality of symbols corresponding in location to the relative locations of the plurality of reference symbols are the corresponding other of said plurality of reference symbols;

combining said weighted probabilities at each step of said sequence into a value and storing said values in an array indexed by the location of said plurality of symbols;

repeating said decoding, sequencing, and combining steps, and accumulating the plurality of said values generated for each data frame in said array, and

aligning the receiver to the symbol corresponding to a one of said plurality of values which exceeds a threshold.

32. The method in claim 31, wherein said sequencing step further includes calculating the weighted probability that each decoded symbol is in error with respect to the value of said reference symbols.

33. The method in claim 31, and wherein said sequencing step utilizes a look-up table of symbol decoding weighted error probabilities.

34. The method of claim 31, and wherein said plurality of weighted probabilities are combined by addition.

35. The method of claim 31, and wherein said weighted probabilities are combined by multiplication.

36. The method of claim 31, and wherein the plurality of said values are accumulated by addition.

37. The method of claim 31, and wherein the plurality of said values are accumulated by multiplication.

38. The method of claim 31, and wherein said threshold is a statistical probability representing a high confidence that the corresponding symbol is one of said plurality of reference symbols.

39. The method of claim 31, and wherein said sequencing through said plurality of symbols is accomplished with a circular buffer.

40. A data receiver operable to align to a reference symbol in a data frame, comprising:

a controller operable to decode each of a plurality of data frames into a plurality of symbols, and operable to determine a weighted probability that each of said plurality symbols is a reference symbol;

a memory coupled to said controller, said controller operable to accumulate said weighted probabilities for each corresponding symbol from said plurality of data frames to a plurality of values stored in said memory, and wherein

said controller is operable to align to the symbol corresponding to a one of said plurality of values which exceeds a threshold.

41. The apparatus in claim 40, and wherein said controller calculates the weighted probability that each decoded symbol is in error with respect to the value of said reference symbol.

42. The apparatus in claim 40, and wherein said controller is operable to access a look-up table of symbol decoding weighted error probabilities in said memory.

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43. The apparatus of claim 40, and wherein said controller accumulates by addition said weighted probabilities to said plurality of values stored in said memory.

44. The apparatus of claim 40, and wherein said controller accumulates by 10 multiplication said weighted probabilities to said plurality of values stored in said memory.

45. A data receiver operable to align to a reoccurring reference symbol in data frames, comprising:

15   a controller operable to receive a signal equal to a single data frame;

a memory coupled to said controller, said controller operable to decode said signal into a plurality of symbols and store them in said memory;

said controller operable to determine a plurality of weighted probabilities that said plurality of symbols are each a reference symbol;

20   said controller operable to repeatedly receive, decode, and determine a plurality of weighted probabilities for a plurality of data frames;

said controller operable to accumulate sets of said plurality of weighted probabilities into a plurality of values in said memory, each corresponding to sets of said plurality of symbols;

25   said controller operable to recall and compare said plurality of values to a threshold value, and if a one of said plurality of values exceeds said threshold,

operable to align to the symbol corresponding to the one of said plurality of values stored in said memory that exceeds said threshold.

46. The apparatus in claim 45, and wherein said controller determines said plurality of weighted probabilities from a look-up table in said memory.

47. The apparatus of claim 45, and wherein said controller accumulates by addition said plurality of weighted probabilities to said plurality of values stored in said memory.

48. The apparatus of claim 45, and wherein said controller accumulates by multiplication said plurality of weighted probabilities to said plurality of values stored in said memory.

49. A data receiver operable to align to a plurality of reference symbols of predetermined relative location within data frames, comprising:

a controller operable to decode each of a plurality of data frames into a plurality of symbols;

a memory coupled to said controller, said controller operable to determine a weighted probability that each of said plurality of symbols is each of the plurality of reference symbols and operable to store said probabilities in said memory;

said controller operable to accumulate said weighted probabilities for each corresponding symbol from said plurality of data frames to a plurality of values and to store them in an array in said memory indexed by the location of said plurality of symbols and said plurality of reference symbols;

said controller operable to calculate a plurality of ordinal probabilities by combining said accumulated weighted probabilities in said array according to the

relative predetermined locations of said plurality of reference symbols for each location of said plurality of symbols, organized into a probability value array in said memory indexed by said location of each of said plurality of symbols, and

said controller operable to align to the symbol indexed to a one of said plurality of ordinal probabilities in said probability value array that exceeds a threshold.

50. The apparatus in claim 49, and wherein said controller is operable to recall said plurality of weighted probabilities from a look-up table in said memory.

51. The apparatus of claim 49, and wherein said controller is operable to accumulate by addition said weighted probabilities to said plurality of values stored in said memory.

52. The apparatus of claim 49, and wherein said controller is operable to accumulate by multiplication said weighted probabilities to said plurality of values stored in said memory.

53. The apparatus of claim 49, and wherein said controller is operable to combine by addition said accumulated weighted probabilities to said plurality of ordinal probabilities by addition.

54. The apparatus of claim 49, and wherein said controller is operable to combine by multiplication said accumulated weighted probabilities to said plurality of ordinal probabilities by multiplication.

55. The apparatus of claim 49, and wherein said plurality of ordinal probabilities or ordered according to the relative positions of said plurality of reference symbols.

5   56. A data receiver operable to align to a plurality of reference symbols of predetermined relative location within data frames, comprising:

a controller operable to decode a data frame into a plurality of symbols, and operable to determine a plurality of weighted probabilities that each of said plurality of symbols is each of said plurality of reference symbols;

10   a memory coupled to said controller, said controller operable to store said plurality of weighted probabilities into an array in said memory, indexed according to each one of said plurality of reference symbols and the location of each one of said plurality of symbols;

said controller operable to repeat said decoding and storing operations for a

15   plurality of data frames, and, operable to accumulate said plurality of weighted probabilities in said array;

said controller operable to store a probability value array in said memory, having a plurality of ordinal probabilities calculated by combining said accumulated plurality of weighted probabilities in said array according to the relative

20   predetermined locations of said plurality of reference symbols, said probability value array indexed by said location of each of said plurality of symbols;

said controller operable to compare said plurality of ordinal probabilities in said probability value array to a threshold, and if a one values exceeds a threshold,

said controller operable to align to the location of the one of said plurality of

25   symbols indexed to the one of said plurality of values exceeding said threshold.

57. The apparatus in claim 56, and wherein said controller accesses a look-up table of symbol decoding weighed error probabilities in said memory.

58. The apparatus of claim 56, and wherein said controller accumulates by addition said plurality of weighted probabilities in said memory.

59. The apparatus of claim 56, and wherein said controller accumulates by multiplication said plurality of weighted probabilities in said memory.

60. The apparatus of claim 56, and wherein said controller combines by addition said accumulated probabilities to said plurality of ordinal probabilities.

61. The apparatus of claim 56, and wherein said controller combines by multiplication said accumulated probabilities to said plurality of ordinal probabilities.

62. A data receiver operable to align to a plurality of reference symbols of predetermined relative location within data frames, comprising:

a controller operable to decode a data frame into a plurality of symbols, and operable to sequence through said plurality of symbols and determine a weighted probability that the present one of said plurality of symbols is a first one of said plurality of reference symbols, and, determine a weighted probability that the relatively located other of said plurality of symbols corresponding in location to the relative locations of the plurality of reference symbols are the corresponding other of said plurality of reference symbols;

a memory coupled to said controller, said controller operable to combine said weighted probabilities at each iteration of said sequence into a value and store said

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values in an array in said memory indexed by the location of said plurality of symbols;

said controller operable to repeatedly decode, sequence, and combine said weighted probabilities, and to accumulate the plurality of said values generated for each data frame in said array, and

said controller operable to align to the symbol corresponding to a one of said plurality of values which exceeds a threshold.

63. The apparatus in claim 62, and wherein said controller accesses a look-up table of symbol decoding weighted error probabilities in said memory.

64. The apparatus of claim 62, and wherein said controller combines by addition said plurality of weighted probabilities.

65. The apparatus of claim 62, and wherein said controller combines by multiplication said plurality of weighted probabilities.

66. The apparatus of claim 62, and wherein said controller accumulates by addition the plurality of said values.

67. The apparatus of claim 62, and wherein said controller accumulates by multiplication the plurality of said values.

68. The apparatus of claim 62, and wherein the relative locations of the plurality of reference symbols, and the probabilities associated therewith, are organized in a circular buffer in said memory.